ISUOG Basic Training

Obtaining & Interpreting Heart Views Correctly
Learning objectives

At the end of the lecture you will be able to:

• Describe how to assess cardiac situs

• Describe the key features of the 4 planes required to assess the fetal heart correctly

• Recognise the differences between the normal & most common abnormal cardiac ultrasound appearances of the 4 planes
Key questions

1. What are the key ultrasound features of plane 7 (chest)?
2. What probe movements are required to move through the 4 cardiac planes correctly?
3. What are the key ultrasound features of plane 10 (3VT)?
4. Which abnormalities should be excluded after correct assessment of planes 7 (chest), 8 (LVOT), 9 (RVOT) & 10 (3VT)?
## The 20 + 2 planes

<table>
<thead>
<tr>
<th>Plane</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sagittal complete spine with skin covering</td>
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<tr>
<td>2</td>
<td>Coronal complete spine</td>
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<tr>
<td>3</td>
<td>Coronal section of body</td>
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<tr>
<td>4</td>
<td>Transventricular plane*</td>
</tr>
<tr>
<td>5</td>
<td>Transthalamic plane*</td>
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<td>6</td>
<td>Transcerebellar plane*</td>
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<tr>
<td>7</td>
<td>Lungs, 4 chamber view of heart</td>
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<td>8</td>
<td>Left ventricular outflow tract (LVOT)</td>
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<td>9</td>
<td>Right ventricular outflow tract (RVOT) &amp; crossover of LVOT</td>
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<tr>
<td>10</td>
<td>3 vessel trachea (3VT) view of heart</td>
</tr>
</tbody>
</table>
Plane 7 (chest) - Four-chamber view
Plane 8 (LVOT) - Left ventricular outflow
Plane 9 (RVOT) - Right ventricular outflow
Plane 10(3VT) – Three vessel trachea
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
Normal situs – abdominal circumference
Normal situs - Chest

Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (2) 2012: 315
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
Cardiac position
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^0 \pm 20^0$ relative to the vertical
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^0 \pm 20^0$ relative to the vertical
- Four chambers present
Four chamber view
Four chamber view
Atrial Chambers

- Two atria, approximately equal in size
- Foramen ovale seen flapping in left atrium
- Atrial septum primum present (adjacent to crux)
- Pulmonary veins entering left atrium
Left atrium
Right atrium

Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (3), 2012
Interatrial septum
Ventricular chambers

- Two ventricles, approximately equal in size
- No ventricular wall hypertrophy
- Moderator band at right ventricular apex
- Ventricular septum intact (apex to crux)
Right ventricle

Moderator band

RV

Moderator band
Right ventricle
Left ventricle
Atrioventricular junction & valves

- Intact cardiac crux
- Two atrioventricular valves open, close & move freely
- Differential offsetting: tricuspid valve leaflet inserts on ventricular septum closer to cardiac apex than the mitral valve
Atrioventricular valves
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^0 \pm 20^0$ relative to the vertical
- Four chambers present
- Regular cardiac rhythm
Regular cardiac rhythm
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^0 \pm 20^0$ relative to the vertical
- Four chambers present
- Regular cardiac rhythm
- No pericardial effusion
Four chamber view - detectable anomalies

Muscular - ventricular septal defect (VSD)
Four chamber view - detectable anomalies

Perimembranous VSD
Four chamber view - detectable anomalies

AVSD
Four-chamber view – detectable anomalies

Hypoplastic left ventricle – univentricular heart
Plane 7- Four chamber view

Normal-size heart in chest
Transverse plane of fetal chest with one complete rib on each side of fetal lateral chest wall
Descending aorta in front and to the left of the fetal spine
Apex of fetal heart pointing to the left upper chest at about a 45-degree angle
Atria equal in size
Foramen ovale in midsection of atrial septum with leaflet of foramen ovale in left atrium
Two inferior pulmonary veins, seen as slitlike opening in posterior wall of left atrium
Patent atrioventricular valves
Tricuspid valve septal leaflet more apically inserted on the septum than mitral valve
Ventricles equal in size and contractility
Intact ventricular septum
Moderator band in right ventricular apex

Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (3), 2012
Plane 7 anomalies excluded

4 chamber view

- Situs abnormality
- Ectopia cordis
- Univentricular heart
- Atrioventricular defect (AVSD)
- Pericardial effusion > 4mm
Plane 8 - Left ventricular outflow
Left ventricular outflow
Left ventricular outflow
Left ventricular outflow

Transposition of the great arteries (TGA)
Left ventricular outflow

- Mitral - aortic continuity
- Aorta completely within left ventricle
- Angle of ascending aorta with ventricular septum, & towards right shoulder
- Aorta does not divide
- Close observation of aortic valve
Plane 8 (LVOT) anomalies excluded

Left Ventricular Outflow Tract

- Overriding aorta
- TGA
Plane 9 (RVOT) - Right ventricular outflow
Plane 10 (3VT) – Three vessel trachea
Three vessel trachea

Blood flows towards the spine
Three vessel trachea
Three vessel trachea – detectable anomalies

3 vessel trachea view
• Severe aortic stenosis (AS)
• Severe pulmonary stenosis (PS)
• Transposition of the great arteries (TGA)
• Truncus
• Hypoplastic left heart syndrome (HLHS)
• Right aortic arch (RAA)
• Interrupted aortic arch (IAA)
• Tetralogy of Fallot (TOF)
Basic Training
Key points

- Normal situs
- Normal axis
- Ventricles equal in size & contractility

- LVOT to right shoulder
- LVOT does not divide
- Aortic valve normal action

- PA anterior to aorta
- PA & Ao similar size
- Pulmonary valve normal action

- 3 vessels seen
- PA & Ao similar size
- DA & Ao Arch to left of trachea
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